DRINKING WATER SURVEILLANCE PROGRAM

ATIKOKAN WATER TREATMENT PLANT

ANNUAL REPORT 1990

Ontario Environment Environnement

ISSN 0843-8331

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DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1990

AUGUST 1992

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PIBS 1990
Log 92-2302-308

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

ATIKOKAN WATER TREATMENT PLANT
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Atikokan water treatment plant, a direct filtration plant with ozone addition to the raw water, treats water from the Atikokan River. The process consists of ozonation, coagulation, flocculation, filtration, pH adjustment, fluoridation and disinfection. The Atikokan water treatment plant serves a population of approximately 4,400.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

The health related guideline for trihalomethanes was exceeded in one treated water sample. The District Officer was notified.

The Atikokan water treatment plant produced adequate quality water, for the sample year 1990, and this was maintained in the distribution system.

Taps should be flushed prior to use to eliminate any standing water which may contain elevated levels of metals.

Treatment plant design and process problems are being addressed by the Municipality and Ministry of the Environment personnel.

93-02474/

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	SITE RAW POSITIVE	SITE RAW %POSITIVE	SITE TREATED TESTS	SITE TREATED POSITIVE	SITE TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE
BACTERIOLOGICAL	8	4	50	13	1	7	5	0	0	6	1	16
CHEMISTRY (FLD)	39	39	100	69	68	98	119	91	76	119	119	100
CHEMISTRY (LAB)	252	191	75	252	201	79	360	329	91	360	328	91
METALS	288	79	27	288	85	29	460	191	41	460	192	41
CHLOROAROMATICS	168	0	0	154	0	0	112	0	0	140	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	200	0	0	183	0	0	.	.	.	.	.	.
PESTICIDES & PCB	384	0	0	374	0	0	169	0	0	213	1	0
PHENOLICS	12	2	16	12	3	25	.	.	.	.	.	.
SPECIFIC PESTICIDES	54	0	0	61	0	0	8	0	0	10	0	0
VOLATILES	348	1	0	319	34	10	290	33	11	290	30	10
TOTAL	1765	316		1737	392		1523	644		1598	671	

DRINKING WATER SURVEILLANCE PROGRAM

ATIKOKAN WATER TREATMENT PLANT
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Atikokan water treatment plant in the fall of 1988. Previous annual reports have been published for 1988 and 1989.

PLANT DESCRIPTION

The Atikokan water treatment plant, a direct filtration plant with ozone addition to the raw water, treats water from the Atikokan River. The process consists of ozonation, coagulation, flocculation, filtration, pH adjustment, fluoridation and disinfection. The Atikokan water treatment plant serves a population of approximately 4,400.

The sample day flows ranged from 2.4 x 1000 m^3/day to 3.0 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **RESULTS FROM RAW AND DISTRIBUTED WATERS;**
- **THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES;**
- **POSITIVE ORGANIC PARAMETERS DETECTED; AND**
- **PERSISTENT TRACES OF ORGANIC PARAMETERS IN THE RAW WATER.**

In this report comments are combined for all sample locations for each parameter discussed. Water in the distribution system can be a mixture from many sources. Due to the many wells supplying this water system and relatively few sample locations on DWSP, this report does not provide a complete picture of the drinking water quality.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

Field pH exceeded the ODWO Aesthetic or Recommended Operational Guideline of 6.5-8.5 pH units in 1 of 12 treated water samples with a maximum reported value of 8.8 pH units. This exceedance was confirmed by the corresponding laboratory pH.

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 8 of 32 treated and distributed water samples with a maximum reported value of 26.2°C.

CHEMISTRY (LAB)

Alkalinity was below the ODWO Aesthetic or Recommended Operational Guideline of 30-500 mg/L in 1 of 29 treated and distributed water samples with a reported value of 26.5 mg/L.

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 HZU in 31 of 32 treated and distributed water samples with a maximum reported value of 18.5 HZU. The existing treatment process was not able to reduce the colour levels below the ODWO.

Dissolved organic carbon exceeded the ODWO Maximum Desirable Concentration of 5.0 mg/L in 32 of 32 treated and distributed water samples with a maximum reported value of 8.3 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1 Formazin Turbidity Units (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in two treated water samples with a maximum reported value of 2.1 FTU but these results were not confirmed by the field turbidity results which were considered to be more reliable.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 4 of 32 treated and distributed water samples with a maximum reported value of 450.0 ug/L.

The prime coagulant, aluminum sulphate, was added in May. The direct filtration process could not adequately treat the type of floc produced by the prime coagulant and its use had to be discontinued. For the remainder of the year a coagulant aid was used instead.

Copper and lead results in the standing samples indicated that household taps should be flushed prior to use, in order to remove any standing water.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was detected at a positive level in 1 of 4 treated and distributed water samples with a reported value of 225 ng/L. The United States Environmental Protection Agency has an ambient water quality criteria of 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

1,1,1-Trichloroethane was found at positive levels in 2 of 28 treated and distributed water samples with a maximum reported value of 0.78 ug/L. This is below the United States Environmental Protection Agency (US EPA) Maximum Contaminant Level of 200 ug/L.

Trans 1,2-dichloroethylene was found at positive levels in 1 distributed water sample with a reported value of 2.1 ug/L. This was below the US EPA Maximum Contaminant Level of 70 ug/L.

Methylene chloride (dichloromethane) was found at positive levels in 1 distributed water sample with a reported value of 8.0 ug/L. This was below the ODWO Maximum Acceptable Concentration of 50 ug/L. Methylene chloride was also detected at 26.9 ug/L in 1 raw water sample, but contamination was suspected by the laboratory.

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs exceeded the ODWO Maximum Acceptable Concentration of 350 ug/L in 1 of 31 treated and distributed water samples with a maximum reported value of 373.5 ug/L; the corresponding chloroform concentration was 367 ug/L. The District Officer was notified. The exceedance was in treated water and was not confirmed in the distribution system samples.

The treatment process was not able to reduce the high levels of natural organic precursors which formed elevated concentrations of THMs upon the addition of chlorine.

CONCLUSIONS

The Atikokan water treatment plant produced adequate quality water, for the sample year 1990, and this was maintained in the distribution system. The treatment process, which included ozonation and direct filtration, was not effective in treating the raw water and failed to meet the ODWOs. The treated water was corrosive and high levels of organic precursors promoted the formation of excessive levels of THMs.

These problems were being addressed by the Municipality, it's consultant and the Ministry of the Environment.

The health related guideline for THMs was exceeded in one treated water sample. The District Officer was notified.

Taps should be flushed prior to use to eliminate any standing water which may contain elevated levels of metals.

FIGURE 1

ATIKOKAN WATER TREATMENT PLANT

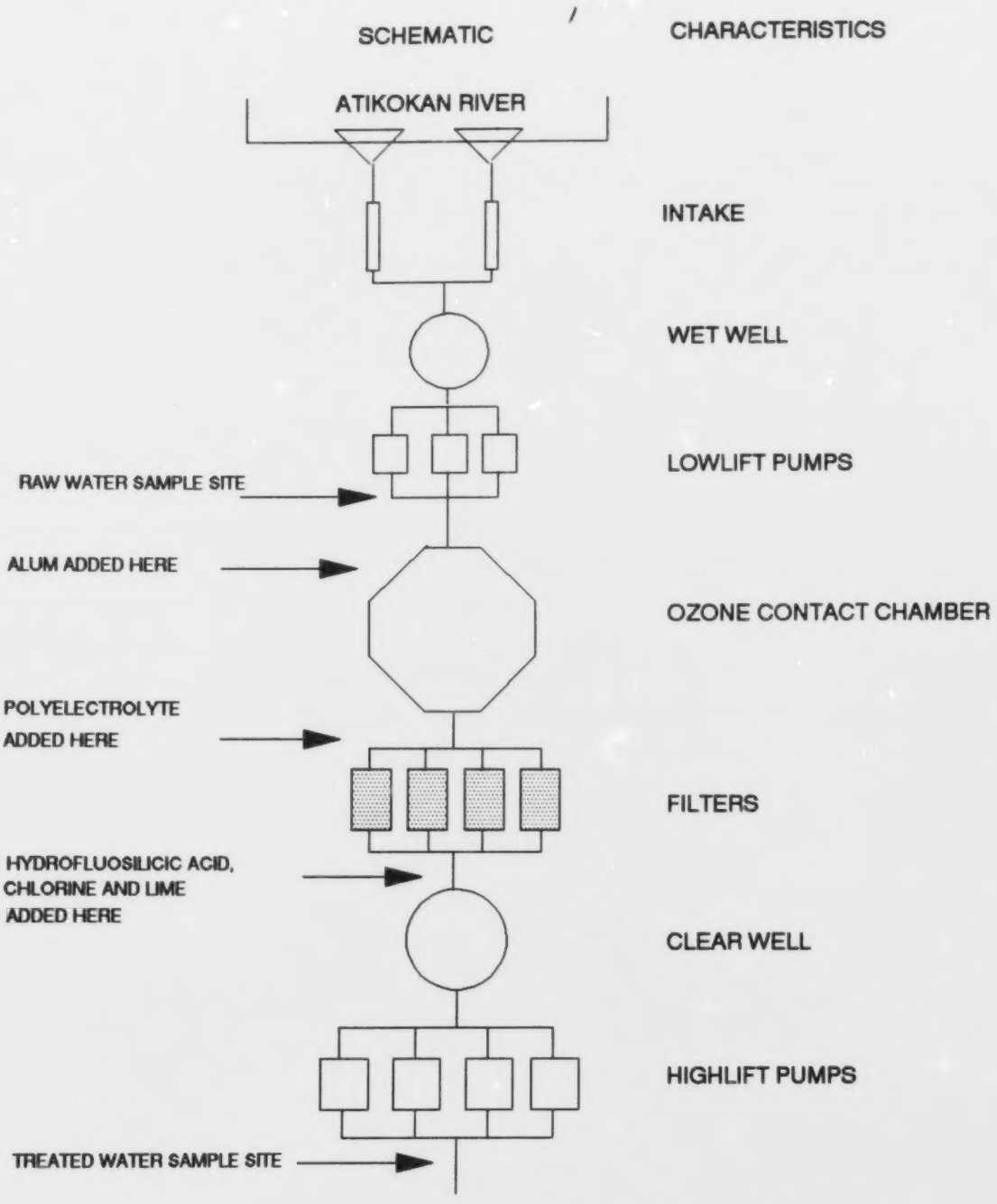

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #:	220000950
PLANT NAME:	ATIKOKAN WTP
DISTRICT:	THUNDER BAY
REGION:	NORTHWEST
DISTRICT OFFICER:	D. MURRAY
UTM #:	156041705400445
PLANT SUPERINTENDENT:	KEITH LUSIGNAN
ADDRESS:	P.O. BOX 689 101 LITTLE FALLS ROAD ATIKOKAN, ONTARIO P0T 1C0 (807)597-4542
MUNICIPALITY:	TOWNSHIP OF ATIKOKAN
AUTHORITY:	PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	6.05	(X 1000 M3/DAY)
RATED CAPACITY:	-	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
ATIKOKAN	4,442

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
ALUMINUM	TREATED WATER IN LAB	DAILY
COMBINED CHLORINE RESIDUAL	TREATED WATER IN LAB	DAILY
FREE CHLORINE RESIDUAL	TREATED WATER IN LAB	DAILY
COLOUR	TREATED WATER IN LAB	DAILY
TOTAL CHLORINE RESIDUAL	TREATED WATER IN LAB	DAILY
FLUORIDE	TREATED WATER IN LAB	DAILY
OZONE RESIDUAL	MIXED WATER IN LAB	DAILY
	AFTER MIXERS	CONTINUOUS
PH	AFTER FILTERS	DAILY
TEMPERATURE	RAW WATER	DAILY
TURBIDITY	AFTER FILTERS	CONTINUOUS
	HIGHLIFT DISCHARGE	CONTINUOUS
	RAW WATER	DAILY

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGE (MG/L)					
			OZONATION	COAGULATION	COAGULATION AID	FLUORIDATION	POST PH ADJUSTMENT	POST CHLORINATION
			OZONE	ALUM LIQUID	POLYELECTROLYTE	HYDROFLUOSILICIC ACID	SODIUM CARBONATE	CHLORINE
DATE	DELAY * TIME(HRS)	FLOW (1000M3)						
JAN 23	.00	.000	6.60		.23		47.30	1.27
FEB 27	.00	.000	4.62		.19		46.29	.52
APR 03	.00	.000	5.07		.70		48.50	.86
APR 24	.00	2.730	.32		.21		36.26	.67
MAY 29	.00	2.916	4.21	7.80	.07		27.00	1.20
JUN 26	.00	3.035	5.23		.06	0.91	45.00	2.90
JUL 31	.00	2.829	6.81		.05	1.01	54.70	1.06
AUG 28	.00	2.932	7.54		.06	0.81	45.65	1.92
SEP 24	.00	2.554	8.40		.06	0.91	21.20	.86
OCT 23	.00	2.657	2.42		.06	.94	31.90	.75
NOV 27	.00	.000	3.60		.20	1.20	37.90	3.50
DEC 11	.25	2.430	4.58		.22	1.35	36.50	

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
AEROMONAS SP	.	.	.	1	0	0	.	.	.	.	.	.
FECAL COLIFORM MF	4	1	0	.	.	.	.	.	.	.	.	.
FECAL COLIFORM	.	.	.	3	0	0	2	0	0	2	0	0
FECAL STREPTOCOCCUS	.	.	.	1	0	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	3	1	0	1	0	0	2	1	0
PSEUDOMON AERUGINOSA	.	.	.	1	0	0	.	.	.	.	.	.
STAPH AUREUS	.	.	.	1	0	0	.	.	.	.	.	.
COLIFORM	.	.	.	3	0	0	2	0	0	2	0	0
TOTAL COLIFORM MF	4	3	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	8	4	0	13	1	0	5	0	0	6	1	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	1	1	0	11	11	0	20	11	0	20	20	0
FLD CHLORINE FREE	1	1	0	11	11	0	20	9	0	20	20	0
FLD CHLORINE (TOTAL)	1	1	0	11	11	0	20	12	0	20	20	0
FLD PH	12	12	0	12	12	0	19	19	0	20	20	0
FLD TEMPERATURE	12	12	0	12	11	0	20	20	0	20	20	0
FLD TURBIDITY	12	12	0	12	12	0	20	20	0	19	19	0
*TOTAL SCAN CHEMISTRY (FLD)	39	39	0	69	68	0	119	91	0	119	119	0
CHEMISTRY (LAB)												
ALKALINITY	12	12	0	12	12	0	20	20	0	20	20	0
CALCIUM	12	12	0	12	12	0	20	20	0	20	20	0
CYANIDE	12	0	1	12	0	0	.	.	.	.	.	.
CHLORIDE	12	11	1	12	12	0	20	20	0	20	20	0
COLOUR	12	12	0	12	12	0	20	20	0	20	20	0
CONDUCTIVITY	12	12	0	12	12	0	20	20	0	20	20	0
DISS ORG CARBON	12	12	0	12	12	0	20	20	0	20	20	0
FLUORIDE	12	0	11	12	12	0	20	20	0	20	20	0
HARDNESS	12	12	0	12	12	0	20	20	0	20	20	0
IONCAL	12	12	0	12	12	0	20	20	0	20	20	0
LANGELIERS INDEX	0	0	0	0	0	0	0	0	0	0	0	0
MAGNESIUM	12	12	0	12	12	0	20	20	0	20	20	0
SODIUM	12	12	0	12	12	0	20	20	0	20	20	0
AMMONIUM TOTAL	12	6	4	12	2	5	20	6	9	20	7	5
NITRITE	12	5	6	12	3	8	20	9	11	20	5	15
TOTAL NITRATES	12	7	4	12	10	2	20	18	2	20	18	2
NITROGEN TOT KJELD	12	12	0	12	12	0	20	20	0	20	20	0
PH	12	12	0	12	12	0	20	20	0	20	20	0
PHOSPHORUS FIL REACT	12	1	6	12	2	7	.	.	.	.	.	.
PHOSPHORUS TOTAL	12	8	3	12	7	4	.	.	.	.	.	.
SULPHATE	12	9	3	12	9	3	20	16	4	20	18	2
TURBIDITY	12	12	0	12	12	0	20	20	0	20	20	0
*TOTAL SCAN CHEMISTRY (LAB)	252	191	39	252	201	29	360	329	26	360	328	24

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	12	0	0	12	0	0	20	0	0	20	0	0
ALUMINUM	12	12	0	12	12	0	20	20	0	20	20	0
ARSENIC	12	7	5	12	10	2	20	15	5	20	15	5
BARIUM	12	12	0	12	12	0	20	20	0	20	20	0
BORON	12	0	12	12	1	11	20	1	19	20	0	19
BERYLLIUM	12	0	0	12	0	0	20	0	1	20	0	0
CADMIUM	12	0	0	12	0	1	20	0	4	20	0	1
COBALT	12	0	12	12	0	12	20	0	20	20	0	20
CHROMIUM	12	0	7	12	0	7	20	0	15	20	0	16
COPPER	12	1	11	12	0	12	20	20	0	20	20	0
IRON	12	12	0	12	12	0	20	20	0	20	20	0
MERCURY	12	1	2	12	2	0	.	.	.	.	.	.
MANGANESE	12	12	0	12	12	0	20	20	0	20	20	0
MOLYBDENUM	12	0	9	12	0	12	20	0	20	20	0	20
NICKEL	12	0	8	12	0	9	20	0	14	20	0	13
LEAD	12	1	11	12	1	8	20	20	0	20	20	0
ANTIMONY	12	1	11	12	2	10	20	5	15	20	5	15
SELENIUM	12	0	1	12	0	0	20	0	2	20	0	0
STRONTIUM	12	12	0	12	12	0	20	20	0	20	20	0
TITANIUM	12	5	7	12	6	6	20	10	10	20	12	8
THALLIUM	12	0	0	12	0	0	20	0	0	20	0	0
URANIUM	12	0	0	12	0	2	20	0	1	20	0	1
VANADIUM	12	0	11	12	0	11	20	0	19	20	0	18
ZINC	12	3	9	12	3	9	20	20	0	20	20	0
*TOTAL SCAN METALS	288	79	116	288	85	112	460	191	145	460	192	136
*TOTAL GROUP INORGANIC & PHYSICAL	579	309	155	609	354	141	939	611	171	939	639	160
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	12	0	0	11	0	0	8	0	0	10	0	0
123 TRICHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
1234 T-CHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
1235 T-CHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
124 TRICHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
1245 T-CHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
135 TRICHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
HCB	12	0	0	11	0	0	8	0	0	10	0	0
HEXACHLOROETHANE	12	0	0	11	0	0	8	0	0	10	0	1
OCTACHLOROSTYRENE	12	0	0	11	0	0	8	0	0	10	0	0
PENTACHLOROBENZENE	12	0	0	11	0	0	8	0	0	10	0	0
236 TRICHLOROTOLUENE	12	0	0	11	0	0	8	0	0	10	0	0
245 TRICHLOROTOLUENE	12	0	0	11	0	1	8	0	0	10	0	0
26A TRICHLOROTOLUENE	12	0	0	11	0	0	8	0	0	10	0	0
*TOTAL SCAN CHLOROAROMATICS	168	0	0	154	0	1	112	0	0	140	0	1
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	12	0	0	11	0	0	.	.	.	.	.	.
ANTHRACENE	10	0	0	9	0	0	.	.	.	.	.	.
FLUORANTHENE	12	0	0	11	0	0	.	.	.	.	.	.
PYRENE	12	0	0	11	0	0	.	.	.	.	.	.
BENZO(A)ANTHRACENE	12	0	0	11	0	0	.	.	.	.	.	.
CHRYSENE	12	0	0	11	0	0	.	.	.	.	.	.
DIMETH. BENZ(A)ANTHR	11	0	0	10	0	0	.	.	.	.	.	.
BENZO(E) PYRENE	12	0	0	11	0	0	.	.	.	.	.	.
BENZO(B) FLUORANTHEN	12	0	0	11	0	0	.	.	.	.	.	.
PERYLENE	12	0	0	11	0	0	.	.	.	.	.	.
BENZO(K) FLUORANTHEN	12	0	0	11	0	0	.	.	.	.	.	.
BENZO(A) PYRENE	11	0	0	10	0	0	.	.	.	.	.	.
BENZO(G,H,I) PERYLEN	12	0	0	11	0	0	.	.	.	.	.	.
DIBENZO(A,H) ANTHRAC	12	0	0	11	0	0	.	.	.	.	.	.
INDENO(1,2,3-C,D) PY	12	0	0	11	0	0	.	.	.	.	.	.
BENZO(B) CHRYSENE	12	0	0	11	0	0	.	.	.	.	.	.
CORONENE	12	0	0	11	0	0	.	.	.	.	.	.
*TOTAL SCAN PAH	200	0	0	183	0	0	0	0	0	0	0	0
PESTICIDES & PCB												
ALDRIN	12	0	0	11	0	0	8	0	0	10	0	0
ALPHA BHC	12	0	3	11	0	5	8	0	4	10	0	3
BETA BHC	12	0	0	11	0	0	8	0	0	10	0	0
LINDANE	12	0	1	11	0	0	8	0	1	10	0	1
ALPHA CHLORDANE	12	0	0	11	0	0	8	0	0	10	0	0
GAMMA CHLORDANE	12	0	0	11	0	0	8	0	0	10	0	0
DIELDRIN	12	0	0	11	0	0	8	0	0	10	0	0
METHOXYCHLOR	12	0	0	11	0	0	8	0	0	10	0	0
ENDOSULFAN I	12	0	0	11	0	0	8	0	0	10	0	0
ENDOSULFAN II	12	0	0	11	0	0	8	0	0	10	0	0
ENDRIN	12	0	0	11	0	0	8	0	0	10	0	0
ENDOSULFAN SULPHATE	12	0	0	11	0	0	8	0	0	10	0	0
HEPTACHLOR EPOXIDE	12	0	0	11	0	0	8	0	0	10	0	0
HEPTACHLOR	12	0	0	11	0	0	8	0	0	10	0	0
MIREX	12	0	0	11	0	0	8	0	0	10	0	0
OXYCHLORDANE	12	0	0	11	0	0	8	0	0	10	0	0
OPDDT	12	0	0	11	0	0	8	0	0	10	0	0
PCB	12	0	0	11	0	0	8	0	0	10	0	0
DDD	12	0	0	11	0	0	8	0	0	10	0	0
PPDDE	12	0	0	11	0	0	8	0	0	10	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	12	0	0	11	0	0	8	0	0	10	0	0
AMETRINE	10	0	0	11	0	0	.	.	.	.	.	.
ATRAZINE	10	0	0	11	0	0	.	.	.	.	.	.
ATRATONE	10	0	0	11	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	10	0	0	11	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	10	0	0	11	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	10	0	0	10	0	0	.	.	.	.	.	.
PROMETONE	10	0	0	11	0	0	.	.	.	.	.	.
PROPAZINE	10	0	0	11	0	0	.	.	.	.	.	.
PROMETRYNE	10	0	0	11	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	9	0	0	10	0	0	.	.	.	.	.	.
SIMAZINE	10	0	0	11	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	10	0	0	11	0	0	.	.	.	.	.	.
METOLACHLOR	10	0	0	11	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	2	0	0	1	0	0	3	1	0
*TOTAL SCAN PESTICIDES & PCB	384	0	4	374	0	5	169	0	5	213	1	4
PHENOLICS												
PHENOLICS	12	2	6	12	3	5	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	12	2	6	12	3	5	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	12	0	0	11	0	0	8	0	0	10	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	1	0	0	1	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	1	0	0	2	0	0	.	.	.	.	.	.
CICP	1	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	1	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	1	0	0	2	0	0	.	.	.	.	.	.
IPC	1	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	1	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	1	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	1	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	54	0	0	61	0	0	8	0	0	10	0	0
VOLATILES												
BENZENE	12	0	0	11	0	4	10	0	3	10	0	2
TOLUENE	12	0	1	11	0	4	10	0	5	10	0	2
ETHYLBENZENE	12	0	3	11	0	5	10	0	3	10	0	5
P-XYLENE	12	0	0	11	0	0	10	0	0	10	0	0
M-XYLENE	12	0	1	11	0	1	10	0	4	10	0	1
O-XYLENE	12	0	1	11	0	2	10	0	3	10	0	2
STYRENE	12	0	6	11	0	8	10	0	7	10	0	6
1,1 DICHLOROETHYLENE	12	0	0	11	0	1	10	0	0	10	0	0
METHYLENE CHLORIDE	12	1	0	11	0	0	10	1	0	10	0	0
T1,2DICHLOROETHYLENE	12	0	0	11	0	0	10	1	0	10	0	0
1,1 DICHLOROETHANE	12	0	0	11	0	0	10	0	0	10	0	0
CHLOROFORM	12	0	0	11	11	0	10	10	0	10	10	0
111, TRICHLOROETHANE	12	0	2	11	1	1	10	1	1	10	0	1
1,2 DICHLOROETHANE	12	0	0	11	0	0	10	0	0	10	0	0
CARBON TETRACHLORIDE	12	0	0	11	0	0	10	0	0	10	0	0
1,2 DICHLOROPROPANE	12	0	0	11	0	0	10	0	0	10	0	0
TRICHLOROETHYLENE	12	0	0	11	0	0	10	0	0	10	0	0
DICHLOROBROMOMETHANE	12	0	0	11	11	0	10	10	0	10	10	0
112 TRICHLOROETHANE	12	0	0	11	0	0	10	0	0	10	0	0
CHLORODIBROMOMETHANE	12	0	0	11	0	11	10	0	10	10	0	10
T-CHLOROETHYLENE	12	0	0	11	0	1	10	0	0	10	0	2
BROMOFORM	12	0	0	11	0	0	10	0	0	10	0	0
1122 T-CHLOROETHANE	12	0	0	11	0	0	10	0	0	10	0	0
CHLOROBENZENE	12	0	0	11	0	0	10	0	0	10	0	0
1,4 DICHLOROBENZENE	12	0	0	11	0	0	10	0	0	10	0	0
1,3 DICHLOROBENZENE	12	0	0	11	0	0	10	0	0	10	0	0
1,2 DICHLOROBENZENE	12	0	0	11	0	0	10	0	0	10	0	0
ETHLYENE DIBROMIDE	12	0	0	11	0	0	10	0	0	10	0	0
TOTL TRIHALOMETHANES	12	0	0	11	11	0	10	10	0	10	10	0
*TOTAL SCAN VOLATILES	348	1	14	319	34	38	290	33	36	290	30	31
*TOTAL GROUP ORGANIC	1178	3	24	1115	37	49	579	33	41	653	31	36

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(TO6) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
AEROMONAS SP ( )			DET'N LIMIT = N/A	GUIDELINE = 0 (A1)		
OCT	.	0	.	.	.	.
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
MAY	8	.	.	.	.	.
JUN	BDL	.	.	.	.	.
JUL	BDL	.	.	.	.	.
SEP	IU	.	.	.	.	.
OCT	BDL	.	.	.	.	.
FECAL COLIFORM (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 0 (A1)		
JAN	.	ILA	.	.	.	.
MAY	.	0	.	0	.	0
JUL	.	0	.	.	.	.
SEP	.	IUN	.	.	.	.
OCT	.	0	.	0	.	0
FECAL STREPTOCOCCUS ( )			DET'N LIMIT = N/A	GUIDELINE = 0 (A1)		
OCT	.	0	.	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)			DET'N LIMIT = 0	GUIDELINE = 500/ML (A3)		
JAN	.	0	.	.	.	.
MAY	.	0	.	0	.	0
JUL	.	6	.	.	.	.
OCT	.	ICS	.	ICS	.	2
PSEUDOMON AERUGINOSA ( )			DET'N LIMIT = N/A	GUIDELINE = N/A		
OCT	.	0	.	.	.	.
STAPH AUREUS ( )			DET'N LIMIT = N/A	GUIDELINE = N/A		
OCT	.	0	.	.	.	.
COLIFORM (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.	ILA	.	.	.	.
MAY	.	0	.	0	.	0
JUL	.	0	.	.	.	.
SEP	.	IUN	.	.	.	.
OCT	.	0	.	0	.	0
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0	GUIDELINE = 5/100ML(A1)		
MAY	16	.	.	.	.	.
JUN	120	.	.	.	.	.
JUL	BDL	.	.	.	.	.
SEP	IU	.	.	.	.	.
OCT	30	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A		
JAN	.	.300	.	.	.200	.400
FEB	.	.300	.000	.400	.200	.200
APR	.	.400	.000	.400	.100	.100
MAY	.	.400	.000	.400	.200	.300
JUN	.	.400	.000	.200	.100	.100
JUL	.	.200	.000	.100	.200	.100
AUG	.	.300	.000	.100	.	.
SEP	.	.300	.	.	.	.
OCT	.	.400	.000	.400	.500	.100
NOV	.	.700	.000	.020	.200	.400
DEC	.	.500	.400	.400	.300	.400
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A		
JAN	.	1.400	.	.	.300	.300
FEB	.	1.400	.000	.000	.100	.300
APR	.	1.100	.000	.000	.100	.100
MAY	.	1.400	.000	.300	.500	.600
JUN	.	1.200	.000	.100	.100	.100
JUL	.	1.900	.000	.000	.100	.100
AUG	.	1.400	.100	.100	.	.
SEP	.	1.900	.	.	.	.
OCT	.	1.800	.000	.100	.100	.400
NOV	.	1.300	.000	.010	.100	.100
DEC	.	1.400	.100	.300	.300	.300
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A		
JAN	.	1.700	.	.	.500	.700
FEB	.	1.700	.000	.400	.300	.500
APR	.	1.500	.000	.400	.200	.200
MAY	.	1.800	.000	.700	.700	.900
JUN	.	1.600	.000	.300	.100	.100
JUL	.	2.100	.000	.100	.300	.200
AUG	.	1.700	.100	.200	.	.
SEP	.	2.200	.	.	.	.
OCT	.	2.200	.000	.500	.600	.500
NOV	.	2.000	.000	.030	.300	.500
DEC	.	1.900	.500	.700	.600	.700
FLD PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)		
JAN	7.000	7.800	.	.	7.000	7.200
FEB	6.800	7.700	7.400	7.200	6.900	7.300
APR	6.800	8.200	7.500	7.500	7.300	7.500
MAY	7.200	7.400	7.400	.	7.100	7.100
JUN	7.200	8.400	7.600	7.600	7.600	7.500
JUL	7.300	8.400	7.700	7.500	7.500	7.500
AUG	7.300	8.400	7.600	7.600	.	.
SEP	7.300	8.800	.	.	.	.
OCT	6.720	7.700	7.600	7.600	7.200	7.800
NOV	6.790	7.750	7.800	7.700	7.400	7.800
DEC	7.000	8.400	7.500	7.800	7.600	7.800

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
JAN	.500	.400	.	.	6.000	3.000
FEB	.800	.000	5.900	3.400	6.000	3.500
APR	12.300	10.800	6.000	3.500	6.000	3.000
MAY	19.500	19.600	9.000	7.500	9.000	8.000
JUN	19.500	19.800	18.000	13.000	14.000	13.500
JUL	21.500	22.000	17.500	17.000	17.000	18.000
AUG	26.300	26.200	23.100	20.600	.	.
SEP	15.100	16.300	.	.	.	.
OCT	8.900	9.100	12.500	10.400	13.000	12.000
NOV	4.200	3.600	17.000	12.000	10.000	7.000
DEC	1.000	1.000	6.000	5.000	7.000	6.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
JAN	.990	.610	.	.	.680	.700
FEB	.970	.460	1.250	1.520	.950	.570
APR	1.480	.660	1.390	.690	.620	.570
MAY	.740	.550	.730	.630	.830	.770
JUN	1.270	.440	2.000	.570	.630	.570
JUL	.730	.370	1.660	.840	.480	.450
AUG	1.570	.260	.780	.410	.	.
SEP	1.500	.450	.	.	.	.
OCT	1.290	.640	1.110	.760	.	.810
NOV	1.000	.650	1.090	.700	.720	.670
DEC	.840	.580	.820	1.210	.910	.690

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)	
JAN	25.900	48.100	.	.	49.500	47.700
FEB	26.200	42.700	49.000	43.500	43.900	43.000
APR	21.900	46.000	49.100	45.500	47.200	46.900
MAY	23.200	26.500	39.700	32.500	35.000	34.600
JUN	17.100	60.900	61.400	60.200	60.100	59.800
JUL	21.000	52.900	54.000	52.500	52.300	52.400
AUG	24.200	56.100	58.100	57.800	.	.
SEP	24.100	51.900	.	.	.	.
OCT	26.100	46.800	51.100	49.100	49.800	49.900
NOV	28.400	46.300	50.300	47.300	47.500	47.500
DEC	28.700	50.600	58.500	52.600	54.400	53.000
CALCIUM (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)	
JAN	10.800	10.100	.	.	10.200	10.400
FEB	10.900	10.800	11.700	11.100	10.600	10.300
APR	8.200	9.000	9.000	8.800	9.000	8.600
MAY	8.800	9.100	10.700	9.600	9.100	9.100
JUN	9.200	9.000	9.000	9.100	9.000	8.800
JUL	9.000	8.800	9.200	9.000	9.400	8.600
AUG	9.200	8.400	8.000	8.000	.	.
SEP	10.000	9.600	.	.	.	.
OCT	9.000	9.000	9.100	9.400	9.800	9.700
NOV	10.100	11.000	11.700	11.200	11.100	11.100
DEC	9.000	9.200	10.800	9.600	9.600	9.600
CYANIDE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = .2 (A1)	
JAN	.002 <T	BDL	.	.	.	.
FEB	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.
CHLORIDE (MG/L)			DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)	
JAN	1.600	6.700	.	.	7.100	6.800
FEB	1.600	5.900	6.600	6.000	6.100	6.100
APR	4.000	8.600	8.900	8.800	8.700	8.700
MAY	1.300	6.800	7.400	7.100	7.300	7.200
JUN	1.300	10.800	11.100	10.800	10.000	9.800
JUL	1.100	7.600	8.500	8.400	8.300	8.200
AUG	.600 <T	7.500	8.000	7.800	.	.
SEP	1.400	6.800	.	.	.	.
OCT	1.100	6.200	6.800	6.400	6.400	6.500
NOV	2.200	6.500	6.700	6.600	6.700	6.500
DEC	2.000	6.800	7.400	6.900	7.100	7.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JAN	33.000	11.000	.	.	12.500	12.000
FEB	32.000	11.500	9.000	13.000	12.500	12.500
APR	47.000	12.000	12.000	13.500	13.000	13.000
MAY	34.500	8.000	9.500	10.000	9.500	9.000
JUN	49.500	11.500	12.500	12.500	12.500	12.000
JUL	27.000	7.500	8.500	9.500	9.000	8.500
AUG	23.000	5.000	6.000	5.500	.	.
SEP	23.000	12.000	.	.	.	.
OCT	27.500	9.000	8.000	11.000	11.000	10.500
NOV	41.000	15.500	16.500	18.500	17.500	17.500
DEC	35.000	11.500	13.500	14.000	13.500	14.000
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
JAN	72	130	.	.	132	130
FEB	72	115	125	116	117	116
APR	63	131	134	128	131	130
MAY	58	100	116	106	110	109
JUN	57	159	159	158	158	157
JUL	59	141	144	141	142	142
AUG	61	147	148	147	.	.
SEP	61	137	.	.	.	.
OCT	66	134	137	133	136	134
NOV	71	126	132	128	128	128
DEC	73	139	152	141	144	143
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
JAN	8.500	8.100	.	.	7.900	8.200
FEB	8.600	8.100	7.100	7.900	7.800	7.900
APR	8.000	7.500	6.400	6.900	6.700	6.700
MAY	7.800	7.300	6.000	6.700	6.700	7.000
JUN	9.000	7.300	6.900	7.300	7.200	7.000
JUL	8.200	7.300	5.700	6.300	6.200	6.200
AUG	7.300	6.500	5.100	5.500	.	.
SEP	7.600	7.500	.	.	.	.
OCT	7.800	7.500	7.100	7.300	7.100	7.200
NOV	9.000	8.100	7.900	7.900	7.900	7.900
DEC	8.500	8.300	7.700	8.200	8.200	8.200
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
JAN	.020 <T	.720	.	.	.720	.720
FEB	.020 <T	.600	.620	.600	.600	.600
APR	.020 <T	.600	.640	.580	.640	.620
MAY	.020 <T	.640	.480	.560	.580	.600
JUN	.020 <T	.960	.960	.960	.960	.960
JUL	.040 <T	.880	.840	.860	.860	.860
AUG	BDL	.720	.720	.720	.	.
SEP	.020 <T	.840	.	.	.	.
OCT	.020 <T	.940	.940	.960	.940	.940
NOV	.040 <T	.600	.600	.620	.600	.600
DEC	.020 <T	.920	.960	.900	.940	.920

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
HARDNESS (MG/L)			DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)	
JAN	34.000	32.500	.	.	32.200	32.300
FEB	34.700	34.300	37.900	35.000	33.700	32.900
APR	26.000	28.000	29.000	28.000	29.000	28.000
MAY	27.100	27.700	34.300	29.300	28.100	28.000
JUN	28.000	28.000	28.200	28.400	28.200	27.700
JUL	28.000	28.000	30.000	28.000	29.000	27.000
AUG	29.100	27.000	26.000	26.000	.	.
SEP	32.000	31.000	.	.	.	.
OCT	29.200	29.300	29.800	30.000	30.900	30.500
NOV	32.700	34.100	35.900	34.800	34.500	34.100
DEC	29.000	28.000	33.000	30.000	30.000	29.000
IONCAL (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	18.160	.227	.	.	3.618	.404
FEB	20.620	11.880	5.021	10.490	6.201	5.711
APR	3.681	11.400	4.902	8.724	9.725	7.939
MAY	5.794	14.380	2.830	5.820	4.602	5.907
JUN	46.190	8.784	4.883	7.994	10.590	9.504
JUL	25.270	9.897	9.498	11.270	11.040	8.200
AUG	18.640	10.070	4.452	4.161	.	.
SEP	21.000	7.086	.	.	.	.
OCT	1.100	9.100	2.023	7.472	7.294	6.170
NOV	3.859	13.250	10.700	13.940	11.390	11.560
DEC	4.080	5.527	2.522	5.342	3.894	5.249
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	-1.268	-.785	.	.	-.779	-.825
FEB	-1.519	-1.210	-.950	-1.101	-1.087	-1.228
APR	-1.646	-.924	-.878	-.928	-.883	-.905
MAY	-1.568	-1.645	-1.077	-1.526	-1.349	-1.423
JUN	-1.571	-.635	-.602	-.605	-.600	-.602
JUL	-1.432	-.718	-.701	-.702	-.725	-.743
AUG	-1.282	-.576	-.692	-.704	.	.
SEP	-1.268	-.137	.	.	.	.
OCT	-1.341	-.878	-.717	-.768	-.785	-.718
NOV	-1.157	-.682	-.642	-.676	-.668	-.678
DEC	-1.133	-.697	-.540	-.663	-.620	-.640
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1		GUIDELINE = 30 (F2)	
JAN	1.600	1.750	.	.	1.650	1.550
FEB	1.800	1.800	2.100	1.750	1.800	1.700
APR	1.400	1.500	1.500	1.500	1.500	1.500
MAY	1.250	1.250	1.850	1.300	1.350	1.250
JUN	1.250	1.350	1.400	1.400	1.400	1.400
JUL	1.300	1.400	1.700	1.400	1.400	1.400
AUG	1.450	1.400	1.600	1.500	.	.
SEP	1.600	1.600	.	.	.	.
OCT	1.650	1.650	1.700	1.600	1.550	1.550
NOV	1.800	1.600	1.650	1.650	1.600	1.600
DEC	1.400	1.200	1.400	1.400	1.300	1.300

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
JAN	2.000	14.000	.	.	13.900	13.900
FEB	1.800	12.500	12.500	12.400	12.000	11.900
APR	2.600	18.400	18.400	17.800	18.600	18.400
MAY	1.100	9.400	10.700	10.200	11.700	12.000
JUN	1.700	26.800	25.700	26.100	26.500	26.100
JUL	1.600	20.800	20.800	21.200	20.600	20.600
AUG	1.700	22.800	22.400	22.200	.	.
SEP	1.400	17.600	.	.	.	.
OCT	1.300	16.500	16.800	16.900	16.900	16.800
NOV	1.800	15.200	15.800	15.700	15.400	15.200
DEC	2.400	18.000	19.000	18.200	19.000	18.600
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JAN	.006 <T	BDL	.	.	BDL	BDL
FEB	.054	.004 <T	BDL	BDL	BDL	BDL
APR	.040	BDL	BDL	.006 <T	.004 <T	.006 <T
MAY	.008 <T	.004 <T	.002 <T	BDL	BDL	BDL
JUN	BDL	BDL	.006 <T	.002 <T	.004 <T	.004 <T
JUL	.006 <T	.002 <T	.002 <T	.022	.016	.010
AUG	.010	.002 <T	.008 <T	.028	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.002 <T	BDL	.006 <T	BDL	BDL	BDL
NOV	.016	.020	.002 <T	.018	.032	.018
DEC	.022	.008 <T	.008 <T	.010	.012	.010
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JAN	.002 <T	.005	.	.	.005	.004 <T
FEB	.005	.002 <T	.004 <T	.004 <T	.004 <T	.002 <T
APR	.005	.004 <T	.004 <T	.004 <T	.003 <T	.004 <T
MAY	.001 <T	.001 <T	.002 <T	.002 <T	.002 <T	.001 <T
JUN	.010	.022	.030	.018	.014	.010
JUL	.003 <T	.003 <T	.005	.005	.003 <T	.002 <T
AUG	.002 <T	.002 <T	.003 <T	.004 <T	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.002 <T	.002 <T	.005	.002 <T	.002 <T	.001 <T
NOV	.010	.015	.011	.012	.023	.007
DEC	.002 <T	.001 <T	.002 <T	.002 <T	.001 <T	.001 <T
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
JAN	.110	.075	.	.	.095	.080
FEB	.080	.105	.105	.105	.120	.105
APR	.045	.085	.080	.085	.090	.090
MAY	.010 <T	.045	.040	.040	.045	.040
JUN	.015 <T	.080	.095	.075	.080	.075
JUL	.015 <T	.050	.055	.055	.055	.060
AUG	.025	.070	.050	.070	.	.
SEP	.015 <T	.020 <T	.	.	.	.
OCT	BDL	.010 <T	.010 <T	.010 <T	.010 <T	.010 <T
NOV	.055	.075	.065	.065	.080	.070
DEC	.030	.040	.040	.030	.040	.035

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02		GUIDELINE = N/A	
JAN	.430	.330	.	.	.380	.330
FEB	.450	.360	.360	.520	.370	.340
APR	.440	.380	.380	.400	.400	.340
MAY	.330	.280	.300	.270	.260	.270
JUN	.420	.340	.360	.340	.350	.350
JUL	.400	.320	.310	.380	.330	.310
AUG	.320	.230	.220	.230	.	.
SEP	.200	.330	.	.	.	.
OCT	.410	.310	.310	.320	.310	.330
NOV	.350	.360	.360	.410	.480	.510
DEC	.340	.280	.290	.290	.300	.300
PH (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
JAN	7.630	7.900	.	.	7.890	7.850
FEB	7.370	7.490	7.660	7.580	7.610	7.490
APR	7.440	7.830	7.850	7.840	7.860	7.860
MAY	7.460	7.330	7.660	7.340	7.510	7.440
JUN	7.570	8.010	8.040	8.040	8.050	8.060
JUL	7.630	7.990	7.980	8.000	7.960	7.980
AUG	7.710	8.130	8.020	8.010	.	.
SEP	7.690	8.540	.	.	.	.
OCT	7.630	7.870	7.990	7.940	7.900	7.970
NOV	7.730	7.980	7.960	7.970	7.980	7.970
DEC	7.800	8.010	8.040	8.010	8.040	8.030
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005		GUIDELINE = N/A	
JAN	.004	.000 <T	.	.	.	.
FEB	.001 <T	.003	.	.	.	.
APR	.000 <T	.000 <T	.	.	.	.
MAY	BDL	.001 <T	.	.	.	.
JUN	.000 <T	.000 <T	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	.001 <T	.002 <T	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
NOV	BDL	.003	.	.	.	.
DEC	.001 <T	.001 <T	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)	
JAN	.008 <T	.013	.	.	.	.
FEB	.015	.014	.	.	.	.
APR	.014	.011	.	.	.	.
MAY	.008 <T	.012	.	.	.	.
JUN	.012	.009 <T	.	.	.	.
JUL	.011	.011	.	.	.	.
AUG	.012	.005 <T	.	.	.	.
SEP	.012	.012	.	.	.	.
OCT	.014	.025	.	.	.	.
NOV	.006 <T	.008 <T	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT				DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW /	STANDING	FREE FLOW
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)		
JAN	3.390	4.700	.	.	4.690	4.550
FEB	3.230	3.500	3.120	3.530	3.400	3.320
APR	3.060	3.070	3.370	3.160	3.060	3.080
MAY	2.730	5.760	5.510	5.780	5.670	5.820
JUN	2.650	2.800	2.710	3.100	3.030	3.140
JUL	2.290 <T	2.490 <T	2.390 <T	2.230 <T	2.410 <T	2.320 <T
AUG	2.290 <T	2.290 <T	2.420 <T	2.390 <T	.	.
SEP	2.350 <T	2.470 <T	.	.	.	.
OCT	3.920	3.960	4.050	3.830	3.970	3.950
NOV	3.380	3.420	3.430	3.520	3.560	3.360
DEC	3.120	3.090	3.030	3.240	3.320	3.040
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)		
JAN	2.500	1.100	.	.	1.200	1.200
FEB	6.000	2.100	1.900	1.600	1.800	1.900
APR	1.040	.850	1.580	.770	.960	.900
MAY	.790	.830	1.100	1.000	1.200	1.100
JUN	1.700	.550	.970	.690	.740	.600
JUL	1.400	.700	1.100	.760	.560	.580
AUG	1.400	.470	.790	.470	.	.
SEP	3.900	.780	.	.	.	.
OCT	2.500	.680	3.700	.910	.830	.690
NOV	1.060	.710	1.350	.760	.800	.730
DEC	1.770	.950	1.140	1.240	1.800	1.250

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
JAN	26.000	41.000	.	.	54.000	48.000
FEB	19.000	30.000	56.000	41.000	44.000	36.000
APR	45.000	68.000	88.000	76.000	78.000	73.000
MAY	26.000	450.000	220.000	410.000	410.000	410.000
JUN	31.000	69.000	120.000	110.000	110.000	100.000
JUL	17.000	33.000	86.000	69.000	68.000	66.000
AUG	20.000	25.000	120.000	85.000	.	.
SEP	54.000	14.000	.	.	.	.
OCT	32.000	16.000	51.000	49.000	39.000	29.000
NOV	21.000	19.000	120.000	28.000	28.000	22.000
DEC	18.000	19.000	28.000	22.000	99.000	23.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
JAN	1.100	1.100	.	.	1.200	1.300
FEB	1.100	1.400	1.100	1.200	1.200	1.200
APR	.680 <T	.980 <T	1.100	.980 <T	1.100	1.100
MAY	.960 <T	1.200	.690 <T	.870 <T	.910 <T	.900 <T
JUN	.910 <T	1.300	1.100	1.400	1.300	1.500
JUL	1.800	1.600	1.400	1.500	1.700	1.600
AUG	1.400	1.500	1.600	1.800	.	.
SEP	1.500	1.400	.	.	.	.
OCT	.980 <T	1.100	1.300	1.200	1.200	1.200
NOV	.870 <T	.920 <T	1.300	.980 <T	1.000 <T	.970 <T
DEC	1.100	1.200	1.100	1.000 <T	1.100	1.100
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
JAN	6.200	5.900	.	.	5.200	5.200
FEB	6.600	6.200	5.600	6.000	6.000	5.800
APR	6.200	6.700	4.500	4.500	4.800	4.900
MAY	5.000	6.300	4.400	7.300	7.100	7.100
JUN	6.000	5.500	3.800	3.600	4.000	4.000
JUL	5.800	5.100	4.500	3.900	3.900	3.900
AUG	5.500	4.600	2.600	2.700	.	.
SEP	6.900	4.000	.	.	.	.
OCT	4.700	4.700	2.900	2.900	2.900	3.100
NOV	6.100	4.900	4.900	3.800	3.900	3.900
DEC	5.700	5.800	4.500	4.600	4.700	4.600
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
JAN	7.100 <T	11.000 <T	.	.	16.000 <T	11.000 <T
FEB	9.300 <T	7.000 <T	6.400 <T	7.200 <T	9.600 <T	10.000 <T
APR	12.000 <T	18.000 <T	19.000 <T	18.000 <T	18.000 <T	17.000 <T
MAY	16.000 <T	21.000	21.000	20.000 <T	19.000 <T	18.000 <T
JUN	7.600 <T	9.100 <T	9.900 <T	8.200 <T	9.500 <T	9.200 <T
JUL	7.200 <T	11.000 <T	14.000 <T	11.000 <T	11.000 <T	11.000 <T
AUG	9.200 <T	10.000 <T	14.000 <T	14.000 <T	.	.
SEP	8.700 <T	12.000 <T	.	.	.	.
OCT	2.600 <T	3.200 <T	4.700 <T	4.400 <T	BDL	4.000 <T
NOV	4.700 <T	4.600 <T	5.700 <T	4.400 <T	4.400 <T	4.300 <T
DEC	5.900 <T	4.200 <T	11.000 <T	4.900 <T	13.000 <T	6.900 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
JAN	BDL	BDL	.	.	BDL	BDL
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	.110 <T	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	.	.160 <T	BDL
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	.320 <T	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	.130 <T	BDL	BDL	BDL
JUL	BDL	BDL	.250 <T	BDL	BDL	BDL
AUG	BDL	.140 <T	BDL	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.140 <T	.120 <T	.	.	.090 <T	.120 <T
FEB	.250 <T	.170 <T	.140 <T	.100 <T	.130 <T	.100 <T
APR	.120 <T	.140 <T	.090 <T	.100 <T	.110 <T	.110 <T
MAY	.100 <T	.090 <T	.160 <T	.080 <T	.090 <T	.120 <T
JUN	.110 <T	.110 <T	.110 <T	.150 <T	.120 <T	.090 <T
JUL	.150 <T	.160 <T	.210 <T	.110 <T	.110 <T	.110 <T
AUG	.150 <T	.120 <T	.050 <T	.060 <T	.	.
SEP	.410 <T	.110 <T	.	.	.	.
OCT	.190 <T	.090 <T	.080 <T	.090 <T	.090 <T	.080 <T
NOV	.120 <T	.080 <T	.130 <T	.130 <T	.120 <T	.100 <T
DEC	.060 <T	.070 <T	.070 <T	.070 <T	.080 <T	.070 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	BDL	1.600 <T	.	.	1.900 <T	1.800 <T
FEB	.580 <T	BDL	BDL	BDL	.650 <T	.940 <T
APR	BDL	1.100 <T	.950 <T	1.100 <T	1.000 <T	1.100 <T
MAY	.630 <T	1.000 <T	.950 <T	1.000 <T	.870 <T	.770 <T
JUN	.970 <T	1.800 <T	2.000 <T	1.600 <T	1.900 <T	1.800 <T
JUL	.540 <T	1.200 <T	1.400 <T	1.300 <T	1.300 <T	1.200 <T
AUG	BDL	.930 <T	1.300 <T	1.200 <T	.	.
SEP	.970 <T	1.700 <T	.	.	.	.
OCT	.610 <T	BDL	1.400 <T	1.400 <T	BDL	1.300 <T
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	.640 <T	BDL	1.300 <T	BDL	1.700 <T	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COPPER (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)	
JAN	4.200 <T	1.300 <T	.	.	160.000	33.000
FEB	3.600 <T	1.600 <T	1200.000	210.000	200.000	23.000
APR	4.700 <T	1.300 <T	840.000	85.000	75.000	19.000
MAY	4.900 <T	2.200 <T	710.000	91.000	88.000	30.000
JUN	3.600 <T	1.700 <T	530.000	98.000	44.000	12.000
JUL	3.400 <T	1.600 <T	500.000	280.000	29.000	19.000
AUG	4.000 <T	1.700 <T	460.000	70.000	.	.
SEP	6.300	1.200 <T	.	.	.	.
OCT	1.800 <T	1.400 <T	77.000	60.000	36.000	12.000
NOV	2.400 <T	1.500 <T	240.000	42.000	42.000	11.000
DEC	3.600 <T	1.700 <T	44.000	13.000	530.000	41.000
IRON (UG/L)			DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)	
JAN	190.000	180.000	.	.	190.000	190.000
FEB	220.000	180.000	140.000	210.000	170.000	190.000
APR	250.000	200.000	180.000	220.000	210.000	230.000
MAY	100.000	79.000	86.000	100.000	95.000	93.000
JUN	210.000	140.000	160.000	160.000	150.000	150.000
JUL	230.000	130.000	150.000	140.000	150.000	140.000
AUG	200.000	91.000	95.000	97.000	.	.
SEP	440.000	81.000	.	.	.	.
OCT	210.000	100.000	120.000	120.000	110.000	110.000
NOV	160.000	140.000	140.000	150.000	150.000	150.000
DEC	140.000	120.000	160.000	160.000	130.000	150.000
MERCURY (UG/L)			DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)	
JAN	.100 <T	.280	.	.	.	.
FEB	.130	.130	.	.	.	.
APR	BDL	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.030 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)	
JAN	18.000	15.000	.	.	9.100	9.100
FEB	19.000	16.000	10.000	9.300	9.900	9.000
APR	22.000	20.000	11.000	11.000	13.000	12.000
MAY	15.000	4.600	7.800	5.200	5.700	4.900
JUN	31.000	4.800	5.400	5.400	5.600	5.200
JUL	53.000	6.200	10.000	6.200	6.300	5.900
AUG	78.000	5.700	5.500	6.100	.	.
SEP	190.000	2.600	.	.	.	.
OCT	51.000	5.100	5.200	5.100	5.600	5.100
NOV	10.000	9.100	5.700	8.100	9.000	8.700
DEC	14.000	12.000	9.700	10.000	6.900	8.800

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	BDL	.150 <T	.	.	.150 <T	.100 <T
FEB	BDL	.090 <T	.060 <T	.130 <T	.110 <T	.070 <T
APR	.120 <T	.180 <T	.200 <T	.190 <T	.200 <T	.130 <T
MAY	.110 <T	.200 <T	.100 <T	.110 <T	.130 <T	.090 <T
JUN	.090 <T	.210 <T	.150 <T	.150 <T	.160 <T	.100 <T
JUL	.080 <T	.180 <T	.200 <T	.140 <T	.180 <T	.150 <T
AUG	.070 <T	.240 <T	.220 <T	.160 <T	.	.
SEP	.060 <T	.150 <T	.	.	.	.
OCT	.080 <T	.370 <T	.170 <T	.170 <T	.140 <T	.130 <T
NOV	.130 <T	.140 <T	.160 <T	.150 <T	.120 <T	.130 <T
DEC	.190 <T	.120 <T	.060 <T	.100 <T	.090 <T	.070 <T
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
JAN	BDL	.360 <T	.	.	1.300 <T	.390 <T
FEB	BDL	BDL	BDL	.390 <T	.480 <T	BDL
APR	.410 <T	.600 <T	.320 <T	.550 <T	.790 <T	.580 <T
MAY	.430 <T	.510 <T	.570 <T	.510 <T	.570 <T	.390 <T
JUN	BDL	BDL	1.600 <T	BDL	.350 <T	BDL
JUL	BDL	.270 <T	2.000 <T	.260 <T	BDL	BDL
AUG	.250 <T	.820 <T	BDL	BDL	.	.
SEP	.530 <T	.240 <T	.	.	.	.
OCT	.360 <T	.410 <T	.340 <T	.310 <T	1.900 <T	.230 <T
NOV	.240 <T	.240 <T	BDL	.210 <T	.430 <T	BDL
DEC	.220 <T	BDL	.230 <T	BDL	BDL	BDL
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JAN	.370 <T	BDL	.	.	33.000	2.000
FEB	.130 <T	.140 <T	16.000	2.100	35.000	2.300
APR	.320 <T	.150 <T	27.000	1.600	6.400	1.200
MAY	.210 <T	.860	15.000	1.300	9.100	.980
JUN	.330 <T	.110 <T	20.000	1.400	6.400	.830
JUL	.320 <T	.140 <T	75.000	2.800	3.600	1.000
AUG	.400 <T	.190 <T	8.600	1.400	.	.
SEP	.470 <T	BDL	.	.	.	.
OCT	.160 <T	BDL	2.600	1.300	4.200	.720
NOV	.360 <T	.190 <T	5.000	1.200	2.200	.530
DEC	20.000	.490 <T	2.900	.510	11.000	.890
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
JAN	.360 <T	.170 <T	.	.	.310 <T	.250 <T
FEB	.620	.430 <T	.540	.450 <T	.470 <T	.440 <T
APR	.270 <T	.260 <T	.260 <T	.330 <T	.330 <T	.580
MAY	.290 <T	.330 <T	.370 <T	.390 <T	.390 <T	.400 <T
JUN	.420 <T	.510	.560	.740	.450 <T	.560
JUL	.180 <T	.360 <T	.400 <T	.440 <T	.300 <T	.340 <T
AUG	.340 <T	.530	.430 <T	.390 <T	.	.
SEP	.390 <T	.380 <T	.	.	.	.
OCT	.450 <T	.290 <T	.410 <T	.450 <T	.430 <T	.310
NOV	.390 <T	.300 <T	.500 <T	.450 <T	.320 <T	.420 <T
DEC	.490 <T	.460 <T	.570	.540	.510	.540

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
JAN	BDL	BDL	.	.	BDL	BDL
FEB	BDL	BDL	1.700 <T	BDL	BDL	BDL
APR	1.500 <T	BDL	BDL	1.700 <T	BDL	BDL
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
JAN	26.000	28.000	.	.	26.000	26.000
FEB	28.000	26.000	26.000	26.000	25.000	24.000
APR	21.000	20.000	21.000	21.000	20.000	20.000
MAY	24.000	21.000	23.000	24.000	23.000	23.000
JUN	22.000	21.000	22.000	21.000	21.000	21.000
JUL	24.000	23.000	22.000	23.000	23.000	22.000
AUG	31.000	25.000	22.000	22.000	.	.
SEP	22.000	21.000	.	.	.	.
OCT	23.000	22.000	22.000	22.000	22.000	22.000
NOV	26.000	24.000	30.000	25.000	25.000	25.000
DEC	27.000	25.000	25.000	26.000	31.000	26.000
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
JAN	6.000	5.400	.	.	6.200	6.500
FEB	3.600 <T	4.400 <T	4.000 <T	4.100 <T	5.900	6.100
APR	5.100	5.300	5.600	5.300	5.100	6.000
MAY	4.900 <T	4.700 <T	5.200	5.600	5.500	5.800
JUN	7.000	8.000	7.800	7.600	8.100	8.100
JUL	4.100 <T	4.100 <T	4.300 <T	4.300 <T	4.300 <T	4.600 <T
AUG	7.200	8.400	6.700	7.000	.	.
SEP	4.200 <T	2.800 <T	.	.	.	.
OCT	4.500 <T	5.100	4.100 <T	4.200 <T	3.900 <T	4.300 <T
NOV	5.200	5.500	5.900	5.600	5.400	5.100
DEC	3.200 <T	4.100 <T	4.200 <T	4.700 <T	4.500 <T	4.200 <T
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
JAN	BDL	BDL	.	.	BDL	BDL
FEB	BDL	.060 <T	BDL	BDL	BDL	BDL
APR	BDL	.060 <T	BDL	BDL	BDL	.070 <T
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	BDL	.060 <T	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	.170 <T	.220 <T	.	.	.180 <T	.180 <T
FEB	.160 <T	.170 <T	.130 <T	.150 <T	.120 <T	.120 <T
APR	.310 <T	.190 <T	.220 <T	.150 <T	.190 <T	.180 <T
MAY	.150 <T	.200 <T	.090 <T	.130 <T	.130 <T	.140 <T
JUN	.240 <T	.220 <T	.200 <T	.200 <T	.210 <T	.200 <T
JUL	.220 <T	.110 <T	.200 <T	.180 <T	.190 <T	.180 <T
AUG	.200 <T	.130 <T	.150 <T	.180 <T	.	.
SEP	.370 <T	.170 <T	.	.	.	.
OCT	.220 <T	.120 <T	.140 <T	.140 <T	.120 <T	.130 <T
NOV	.160 <T	.130 <T	.130 <T	.090 <T	.090 <T	.110 <T
DEC	BDL	BDL	.060 <T	BDL	BDL	BDL
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
JAN	1.700 <T	1.800 <T	.	.	19.000	4.300
FEB	1.400 <T	1.500 <T	25.000	5.800	19.000	4.200
APR	2.200	1.700 <T	12.000	3.500	11.000	3.900
MAY	1.400 <T	2.300	15.000	5.900	13.000	5.700
JUN	1.300 <T	2.000 <T	15.000	3.500	7.100	2.400
JUL	1.300 <T	1.900 <T	120.000	6.400	4.700	2.700
AUG	.940 <T	2.200	6.200	3.800	.	.
SEP	2.500	.510 <T	.	.	.	.
OCT	1.700 <T	4.900	3.900	2.700	8.800	3.700
NOV	1.800 <T	2.000 <T	8.900	3.900	7.800	3.700
DEC	3.900	2.000 <T	10.000	4.200	8.000	2.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLOROAROMATICS						
HEXACHLOROETHANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 1900 (D4)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	IIS	.	IIS	.	BDL
NOV	BDL	BDL	.	BDL	.	6.000 <T
DEC	BDL	BDL	.	IIS	.	BDL
245 TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	45.000 <T	.	.	.	.
OCT	BDL	IIS	.	IIS	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	IIS	.	BDL
HEXACHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 206000 (D4)		
OCT	BDL	IIS	.	IIS	.	225.000
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	IIS	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
JAN	1.000 <T	1.000 <T	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	1.000 <T	.	BDL	.	BDL
MAY	2.000 <T	1.000 <T	.	1.000 <T	.	2.000 <T
JUN	BDL	1.000 <T	.	1.000 <T	.	1.000 <T
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	2.000 <T	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	IIS	.	IIS	.	BDL
NOV	1.000 <T	1.000 <T	.	1.000 <T	.	1.000 <T
DEC	BDL	BDL	.	IIS	.	BDL
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	1.000 <T	BDL	.	BDL	.	1.000 <T
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	9.000 <T	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	IIS	.	IIS	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	IIS	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .200	GUIDELINE = 2 (A4)		
JAN	.600 <T	1.600	.	.	.	.
FEB	.600 <T	1.200	.	.	.	.
APR	BDL	BDL	.	.	.	.
MAY	.400 <T	.600 <T	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	BDL	BDL	.	.	.	.
AUG	.400 <T	BDL	.	.	.	.
SEP	BDL	.600 <T	.	.	.	.
OCT	.600 <T	.800 <T	.	.	.	.
NOV	2.600	.700 <T	.	.	.	.
DEC	.600 <T	.800 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	.100 <T	.	.100 <T	.	.100 <T
APR	BDL	.100 <T	.	.100 <T	.	BDL
MAY	BDL	.050 <T	.	BDL	.	.050 <T
JUN	BDL	.050 <T	.	BDL	.	BDL
JUL	BDL	IIV	.	.100 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
JAN	.100 <T	BDL	.	.	.	BDL
FEB	BDL	BDL	.	.050 <T	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	.050 <T	.	.050 <T	.	.050 <T
JUN	BDL	.050 <T	.	BDL	.	BDL
JUL	BDL	IIV	.	.150 <T	.	BDL
AUG	BDL	.050 <T	.	.050 <T	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.050 <T
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	.200 <T	.	.150 <T	.	.100 <T
APR	.100 <T	.100 <T	.	.100 <T	.	.050 <T
MAY	BDL	.050 <T	.	BDL	.	.100 <T
JUN	BDL	.100 <T	.	BDL	.	BDL
JUL	BDL	IIV	.	.150 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.050 <T	BDL	.	BDL	.	BDL
NOV	.100 <T	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.150 <T
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)		
JAN	.200 <T	BDL	.	.	.	BDL
FEB	BDL	BDL	.	.200 <T	.	BDL
APR	BDL	BDL	.	.100 <T	.	BDL
MAY	BDL	BDL	.	BDL	.	.100 <T
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	IIV	.	.200 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	.100 <T	BDL	.	.	.	BDL
FEB	BDL	BDL	.	.100 <T	.	.050 <T
APR	BDL	BDL	.	.050 <T	.	BDL
MAY	BDL	BDL	.	BDL	.	.050 <T
JUN	BDL	.100 <T	.	BDL	.	BDL
JUL	BDL	IIV	.	.100 <T	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	.050 <T	.100 <T	.	.	.	.150 <T
FEB	.100 <T	.200 <T	.	.250 <T	.	.200 <T
APR	.150 <T	.250 <T	.	.200 <T	.	.150 <T
MAY	BDL	.050 <T	.	.100 <T	.	.200 <T
JUN	BDL	.150 <T	.	BDL	.	BDL
JUL	BDL	IIV	.	.300 <T	.	.050 <T
AUG	BDL	.050 <T	.	BDL	.	.
SEP	BDL	.050 <T	.	.	.	.
OCT	.100 <T	BDL	.	.050 <T	.	BDL
NOV	.250 <T	BDL	.	.100 <T	.	BDL
DEC	.050 <T	BDL	.	BDL	.	.250 <T
1,1 DICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.100	GUIDELINE = 7 (D1)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	.300 <T	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	IIV	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
METHYLENE CHLORIDE (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
JAN	26.500	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	IIV	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
T1,2DICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 70 (D1)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	IIV	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	110.400	.	.	.	106.400
FEB	BDL	94.100	.	80.100	.	90.400
APR	BDL	155.200	.	180.100	.	133.900
MAY	BDL	175.300	.	153.500	.	157.600
JUN	BDL	305.000	.	314.000	.	333.000
JUL	BDL	IIV	.	221.000	.	303.000
AUG	BDL	367.000	.	257.000	.	.
SEP	BDL	329.000	.	.	.	.
OCT	BDL	224.000	.	157.100	.	183.800
NOV	BDL	181.000	.	158.400	.	166.800
DEC	BDL	161.100	.	148.300	.	131.900
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JAN	.020 <T	BDL	.	.	.	BDL
FEB	BDL	BDL	.	.280	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	.780	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	IIV	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.020 <T	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JAN	BDL	2.950	.	.	.	2.750
FEB	BDL	2.800	.	2.150	.	2.300
APR	BDL	3.500	.	3.600	.	2.900
MAY	BDL	3.100	.	2.900	.	3.000
JUN	BDL	5.200	.	4.600	.	4.750
JUL	BDL	IIV	.	4.850	.	5.650
AUG	BDL	6.250	.	5.150	.	.
SEP	BDL	4.400	.	.	.	.
OCT	BDL	4.200	.	3.450	.	3.750
NOV	BDL	3.300	.	3.100	.	3.250
DEC	BDL	3.350	.	3.200	.	3.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ATIKOKAN WTP 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	BDL	.400 <T	.	.	.	.300 <T
FEB	BDL	.300 <T	.	.200 <T	.	.300 <T
APR	BDL	.200 <T	.	.300 <T	.	.200 <T
MAY	BDL	.300 <T	.	.300 <T	.	.300 <T
JUN	BDL	.200 <T	.	.200 <T	.	.200 <T
JUL	BDL	IIV	.	.200 <T	.	.300 <T
AUG	BDL	.300 <T	.	.200 <T	.	.
SEP	BDL	.100 <T	.	.	.	.
OCT	BDL	.300 <T	.	.200 <T	.	.200 <T
NOV	BDL	.300 <T	.	.400 <T	.	.400 <T
DEC	BDL	.200 <T	.	.200 <T	.	.200 <T
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
JAN	BDL	BDL	.	.	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	.050 <T	.	BDL	.	.050 <T
JUL	BDL	IIV	.	BDL	.	.050 <T
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
TOTAL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
JAN	BDL	113.750	.	.	.	109.500
FEB	BDL	97.150	.	82.500	.	92.950
APR	BDL	158.950	.	184.000	.	137.000
MAY	BDL	178.800	.	156.700	.	160.900
JUN	BDL	310.450	.	318.800	.	338.000
JUL	BDL	IIV	.	226.050	.	308.900
AUG	BDL	373.500	.	262.400	.	.
SEP	BDL	333.550	.	.	.	.
OCT	BDL	228.450	.	160.800	.	187.800
NOV	BDL	184.550	.	161.850	.	170.400
DEC	BDL	164.650	.	151.750	.	135.150

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BACTERIOLOGICAL		/		
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.2	30-500	(A3)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.2	100	(F2)
CHLORIDE	MG/L	0.2	250	(A3)
COLOUR	TCU	0.5	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.0	400	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0	(A3)
FLUORIDE	MG/L	0.01	2.4	(A1)
HARDNESS	MG/L	0.5	80-100	(A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.1	30.0	(F2)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
SODIUM	MG/L	0.2	200	(A4)
SULPHATE	MG/L	0.2	500	(A3)
TOTAL NITRATES	MG/L	0.005	10.0	(A1)
TURBIDITY	FTU	0.05	1.0	(A1)
CHLOROAROMATICS				
123 TRICHLOROBENZENE	NG/L	5.0	N/A	
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A	
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A	
124 TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A	
236 TRICHLOROTOLUENE	NG/L	5.0	N/A	
245 TRICHLOROTOLUENE	NG/L	5.0	N/A	
26A TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)
CHLOROPHENOLS				
234 TRICHLOROPHENOL	NG/L	100.0	N/A	
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A	
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A6)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	3500 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the

treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled

Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.